

WHAT IS CLAIMED IS:

1. A MEMS (Micro Electro Mechanical System) variable optical attenuator comprising:

5 a substrate having a flat upper surface;
 optical transmitting and receiving terminals arranged on the upper surface of the substrate so that optical axes of the terminals coincide with each other;

10 a movable optical waveguide arranged at a location such that it attenuates the maximum amount of light transmitted between the optical transmitting and receiving terminals;

 a micro actuator arranged on the substrate for moving the movable optical waveguide; and

15 a voltage supply unit for supplying driving voltage to the micro actuator,

 wherein the micro actuator moves the movable optical waveguide so that the light attenuation amount is decreased in accordance with the increase in the driving voltage applied by the voltage supply unit.

20 2. The MEMS variable optical attenuator as set forth in claim 1,

 wherein the movable optical waveguide is arranged at a location such that it completely blocks the light transmitted

between the optical transmitting and receiving terminals when the driving voltage is 0, and moved to another location such that it passes at least a part of the light transmitted between the optical transmitting and receiving terminals when the voltage supply unit begins to supply the driving voltage to the micro actuator.

3. The MEMS variable optical attenuator as set forth in claim 1,

wherein the voltage supply unit includes a differential circuit unit for decreasing the driving voltage to be outputted in accordance with the increase of input voltage.

4. The MEMS variable optical attenuator as set forth in claim 1,

wherein the movable optical waveguide moves in the direction perpendicular to the optical axes.

5. The MEMS variable optical attenuator as set forth in claim 1,

wherein the movable optical waveguide rotates centering around the optical axes.

6. The MEMS variable optical attenuator as set forth in

claim 1,

wherein the micro actuator includes:

a movable electrode unit arranged on the substrate and provided with a first comb unit moving in the direction perpendicular to the optical axes; and

a driving electrode unit fixed to the substrate and provided with a second comb unit interdigitated with the first comb unit.

7. The MEMS variable optical attenuator as set forth in claim 6,

wherein the movable electrode unit is arranged between the driving electrode unit and the optical axes of the optical transmitting and receiving terminals.

8. The MEMS variable optical attenuator as set forth in claim 1,

wherein the micro actuator includes:

a driving electrode unit fixed to the substrate; and

a movable electrode unit hinged to the substrate, and provided with a first terminal separated from the upper surface of the driving electrode by a certain distance and a second terminal connected to the movable optical waveguide so that the second terminal moves upward and downward.

9. A method for operating a movable optical waveguide so as to attenuate light to a desired amount, said light transmitted between optical transmitting and receiving terminals arranged on an upper surface of a substrate so that optical axes of the terminals coincide with each other, comprising the steps of:

(a) arranging the movable optical waveguide at an initial location such that it attenuates the maximum amount of light transmitted between the optical transmitting and receiving terminals; and

(b) moving the movable optical waveguide so that the light attenuation amount is decreased by the increase in driving voltage.

10. The method as set forth in claim 9,

wherein the movable optical waveguide arranged at the initial location completely blocks the light transmitted between the optical transmitting and receiving terminals when the driving voltage is 0, and then is moved to another location such that it passes at least a part of the light transmitted between the optical transmitting and receiving terminals when the driving voltage begins to be supplied.

11. The method as set forth in claim 9,

wherein the driving voltage for moving the movable optical waveguide is inversely proportional to input voltage.

12. The method as set forth in claim 9,

5 wherein the step (b) includes the step of moving the movable optical waveguide in the direction perpendicular to the optical axes.

13. The method as set forth in claim 9,

10 wherein the step (b) includes the step of rotating the movable optical waveguide centering around the optical axes.